Clinico-mycological profile of diagnosed cases of dermatophytosis in a tertiary care hospital, Pune: A cross-sectional study

Running title: Dermatophytosis in a tertiary care hospital

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Abstract

Introduction: Dermatophytes are keratinophilic fungi that cause superficial infections of the skin, hair, and nails. The prevalence of dermatophytosis is influenced by factors such as climate, age, gender, lifestyle, and socioeconomic status. In tropical and subtropical regions like India, hot and humid conditions contribute to its high incidence. This study aimed to isolate and identify dermatophytes from clinically diagnosed cases of dermatophytosis.

Methods: A total of 100 clinically diagnosed cases were examined by direct microscopy (KOH mount) and fungal culture on Sabouraud Dextrose Agar (SDA) and Dermatophyte Test Medium (DTM).

Results: The most common clinical presentation was Tinea corporis (42%), followed by Tinea cruris (25%) and Tinea unguium (21%). Out of 100 samples, 53 were culture-positive. The predominant isolates were *Trichophyton rubrum* (30%), *Trichophyton mentagrophytes* (20%), and *Trichophyton violaceum* (13.3%). Among culture media, SDA yielded 92.45% isolates, while DTM showed higher sensitivity (96.22%).

Conclusion: Isolation and identification of dermatophytes are crucial for accurate diagnosis, effective treatment, and epidemiological surveillance. Understanding local prevalence and etiological agents helps in managing therapeutic challenges and preventing transmission.

Key words: Dermatophytosis, Tinea corporis, *Trichophyton rubrum*, Dermatophyte test Medium (DTM)

Introduction

Dermatophytosis, commonly known as "Tinea" or "Ringworm" infection, is a superficial fungal infection caused by dermatophytes, filamentous fungi that thrive on keratinized tissues. These fungi belong to seven primary genera: *Arthroderma*, *Epidermophyton*, *Lophophyton*, *Microsporum*, *Nannizia*, *Paraphyton*, and *Trichophyton*. They infect the stratum corneum, hair, and nails in humans and animals, leading to a highly prevalent yet non-fatal condition with significant morbidity and cosmetic concerns. The lifetime risk of acquiring dermatophytosis is estimated at 10–20%, making it one of the most frequent cutaneous fungal infections worldwide (1). The prevalence of dermatophytosis varies depending on environmental factors, personal hygiene, age, gender, and socioeconomic status. Tropical and subtropical regions, such as India, with hot and humid climates, report higher incidences due to favorable conditions for fungal growth (2). Although not life-threatening, dermatophytosis remains a major public health concern due to its chronic nature, recurrence, and impact on quality of life.

Accurate diagnosis is crucial, as the clinical presentation of dermatophytosis often mimics other dermatological disorders. Misdiagnosis can lead to inappropriate treatment, exacerbating the condition. Therefore, understanding the clinico-mycological profile of dermatophytosis is essential for initiating targeted therapy and epidemiological surveillance (3,4).

Given these considerations, the present study aims to evaluate the clinico-mycological profile of dermatophytosis, providing insights for effective management and contributing to broader public health knowledge.

Methods

This cross-sectional study included 100 clinically diagnosed dermatophytosis cases across all age groups and both sexes, recruited from the outpatient department of Dermatology and Venereology at a tertiary care hospital in Pune, India. Patients on antifungal therapy or with Tinea nigra or Tinea versicolor infections were excluded.

Skin scrapings were collected from lesion borders using a sterile scalpel after cleaning the area with 70% alcohol, while scalp hair samples were epilated with sterilized forceps. Affected nails were cleaned with 70% alcohol before scraping. All specimens were stored in sterile paper envelopes and transported to the microbiology laboratory for analysis.

In the laboratory, specimens underwent potassium hydroxide (KOH) wet mount microscopy and were cultured on Sabouraud's dextrose agar (SDA) and dermatophyte test medium (DTM) (HiMedia Laboratories Pvt. Ltd.). Fungal isolates were identified based on colony morphology, pigmentation, growth rate, microscopic features (lactophenol cotton blue mount and slide culture), urease test, and hair perforation test. Data were entered in an Excel sheet and expressed in numbers and percentages, compiled in a table and figures.

Results

This study analyzed 100 clinically suspected dermatophytosis cases, comprising skin scrapings (73%), nail clippings (18%), and hair strands (9%). Dermatophytes were isolated in 53% of cultures, while 47% were culture-negative. Males (62%) were more frequently affected than females (38%), with a male-to-female ratio of 1.63:1. The highest prevalence occurred in the 21-30-year age group (36%), followed by 31-40 years (20%). Occupationally, manual workers constituted the largest affected group (44%), ahead of students (23%), household workers (15%), and professionals/service workers (18%).

Tinea corporis (42%) was the predominant clinical presentation, followed by tinea cruris (25%), tinea unguium (21%), tinea capitis (4%), mixed tinea corporis and cruris (6%), and tinea pedis (2%). Among tinea corporis cases (n=42), dermatophytes were isolated in 69% (n=29), with *Trichophyton rubrum* (37.93%) being the most common, followed by *T. mentagrophytes* (13.7%) and *T. violaceum* (10.3%). In tinea cruris (n=25), 48% (n=12) yielded positive cultures, primarily *T. mentagrophytes* (33.33%) and *T. rubrum* (12%). Both tinea pedis

cases (n=2) showed equal isolation of *T. rubrum* and *T. mentagrophytes* (50% each). Tinea capitis (n=4) cultures grew *T. mentagrophytes* (25%), *T. soudanense*, and *T. equinum*. Mixed tinea corporis and cruris (n=6) predominantly featured *T. verrucosum* (33.33%).
Microscopic examination with KOH correlated with culture results in 85% of cases: 50% were positive by both methods, while 35% were negative in both. Discrepancies included KOH-positive/culture-negative (12%) and KOH-negative/culture-positive (3%) results. Dermatophyte isolation rates were higher on Dermatophyte Test Medium (DTM; 96.22%) than on Sabouraud Dextrose Agar (SDA; 92.45%).

Discussion

In this study, 100 clinically suspected cases of dermatophytosis were evaluated over one year, comprising skin scrapings (73%), nail clippings (18%), and hair samples (9%). Dermatophytes were isolated in 53% of cases, aligning with the findings of Sudip Das et al. (5).
Consistent with most studies (6-8), males were more frequently affected (62%) than females (38%), yielding a male-to-female ratio of 1.63:1. This disparity may reflect greater outdoor exposure among males (1, 3, 9), while underreporting in females could stem from social stigma in the Indian context. Manual workers (44%)-particularly agricultural laborers-constituted the largest affected group, likely due to occupational exposure to heat, humidity, and trauma. Students (23%) and professionals/service workers (18%) followed, corroborating earlier reports linking dermatophytosis to physical activity and environmental factors.
The 21-30-year age group was most susceptible (36%), consistent with studies by Sahai S et al. (10), Singh S et al. (9), and Hanumanthappa H et al. (11). This predilection may arise from heightened physical activity, excessive sweating, and tropical climates (12). Tinea corporis (42%) and tinea cruris (25%) dominated clinically, mirroring findings from Doddamani PV et al. (13) (54.5% corporis, 25.5% cruris) and singh S et al. (9) (58% corporis, 12.3% cruris). The symptomatic nature of these variants (e.g., pruritus) likely drives higher hospital attendance (14).
Trichophyton rubrum (30%) was the predominant isolate, followed by *T. mentagrophytes* (20%) and *T. violaceum* (13.3%). These results align with Pandey A et al. (15) (*T. rubrum*: 42.25%; *T. mentagrophytes*: 12.7%) and Ishrat A et al. (8). However, studies from Iran (Bassiri-Jahromi S et al.) and India (Karmarkar S et al. (16)) reported *Epidermophyton floccosum* (32%) and *T. violaceum* as leading agents, respectively, highlighting regional variability. The global shift toward *Trichophyton* species, particularly *T. rubrum*, may reflect its chronicity and host adaptation (17).
KOH microscopy and culture showed 50% concordance (positive in both), while 12% were KOH-positive/culture-negative and 3% KOH-negative/culture-positive. Similar discrepancies were noted by Singh S et al. (9) and Sumana V et al. (18). DTM (96.22% isolation rate) outperformed SDA (92.45%), consistent with Yavuzdemir et al. (19) (DTM: 95.4%; SDA: 93.5%). DTM's faster diagnosis (10–12 days vs. SDA's 14–21 days) underscores its utility, though larger studies are needed for validation.

Conclusion

This study found that Trichophyton rubrum (30%) was the most common causative agent of dermatophytosis, primarily presenting as Tinea corporis (42%) and Tinea cruris (25%), with a higher prevalence in young males (21–30 years, 36%), particularly manual laborers. KOH microscopy and fungal culture showed good diagnostic agreement (85%), while DTM proved superior to SDA (96.22% vs. 92.45% isolation rate). These findings emphasize the importance of accurate mycological diagnosis and targeted antifungal treatment to manage this highly prevalent infection effectively.

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Ethical statement
Approved by Ethical Committee, B.V.D.U. Medical College Pune.

Conflicts of interest
The authors declare that they have no competing interests

Data availability statement
The data that support the findings of this study are available from the corresponding author upon reasonable request

Authors contributions
MS: Had done literature search, sample collection and processing, identification of isolates, data acquisition, data analysis, and manuscript writing. BD: Involved in designing the study, identification of isolates, data analysis, and manuscript editing. MM: contributed to manuscript editing and manuscript review.

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Table 1. Dermatophytes isolated from various clinical types of Dermatophytosis

Clinical disease	No. of samples	*T. rubram*	*T. mentagrophyte*	*T. violaceum*	*T. verrucosum*	*T. interdigitalae*	*T.tonsurans*	*T.soudanense*	*T. equinum*	*T.erinacae*	*Microsporum canis*	Total
Tinea corporis (%)	42	11 37%	4 13%	3 10%	2 7%	3 10%	1 3%	1 3%	1 3%	2 6%	2 6%	29 69%
Tinea cruris (%)	25	3 12%	4 33%	3 25%	1 8%	0	1 8%		0	0	0	12 48%
Tinea unguium (%)	21	0	0	0	0	0	0	0	0	0	0	0 0%
Tinea corporis-cruris (%)	6	1 16%	1 16%	1 16%	2 33%	0	1 16%	0	0	0	0	6 100%
Tinea capitis (%)	4	0	1 25%	0	0	0	0	1 25%	1 25%	0	0	3 75%
Tinea pedis(%)	2	1 50%	1 50%	0	0	0	0	0	0	0	0	2 100%
Total (%)	100	16 30%	11 20%	7 13%	5 10%	3 6%	3 6%	2 3%	2 3%	2 3%	2 3%	53 100%

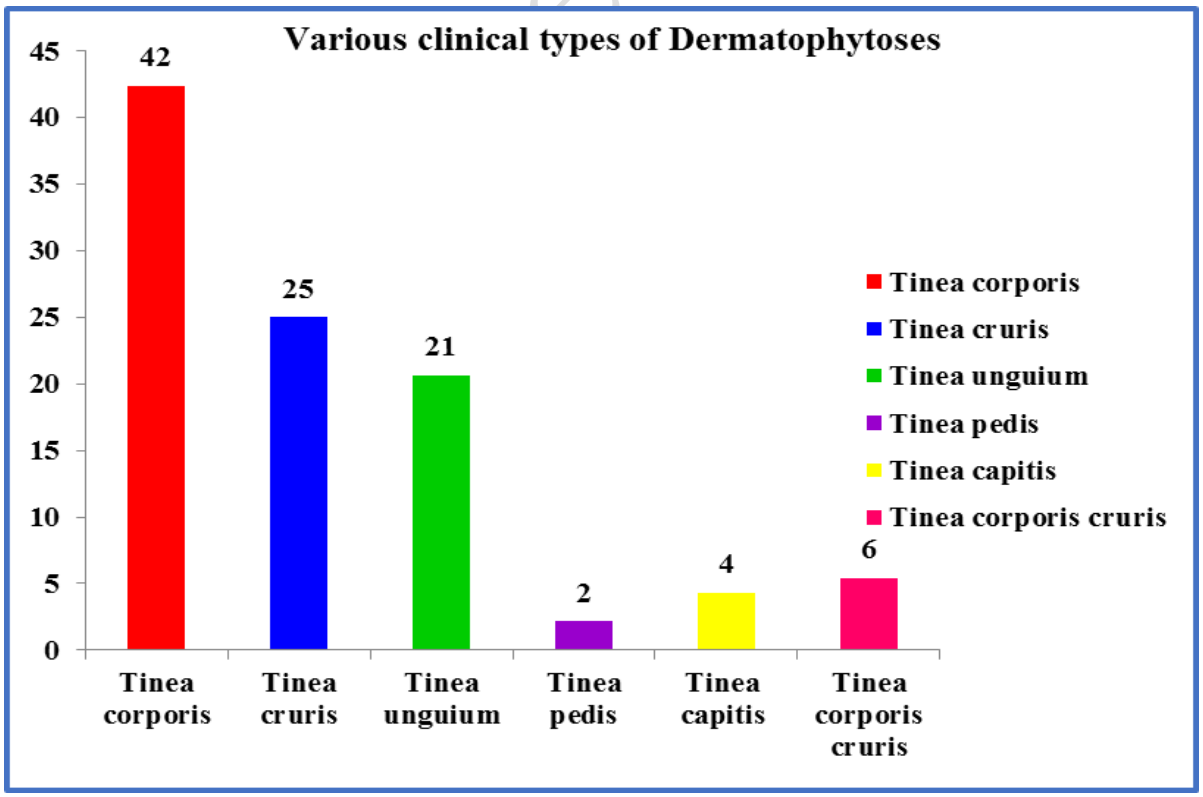

Figure 1. Various clinical types of dermatophytosis

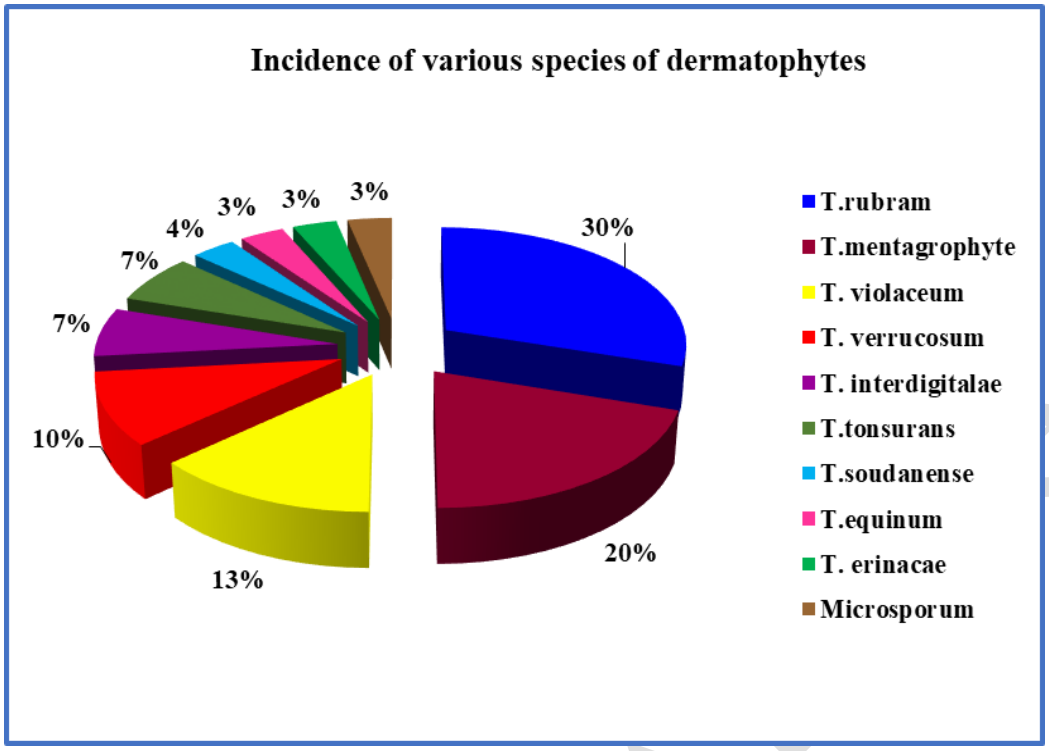

Figure 2. Incidence of various species of Dermatophytes

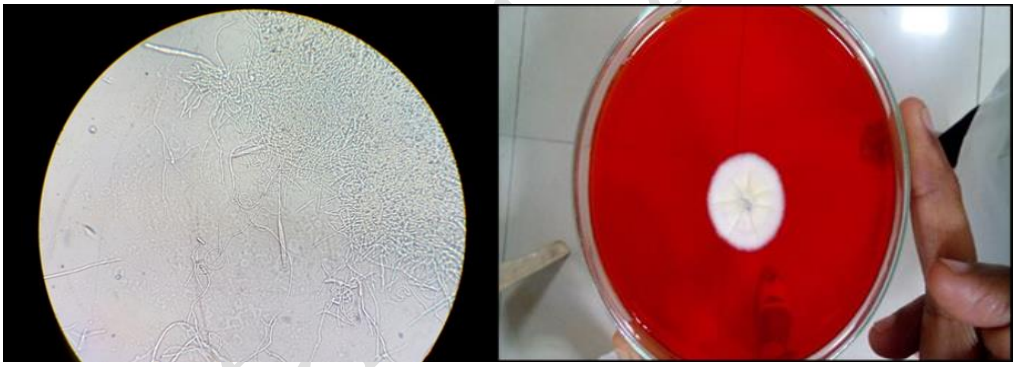

Figure 3. *T. rubram* tubular macroconidia and growth on Dermatophyte Test Medium

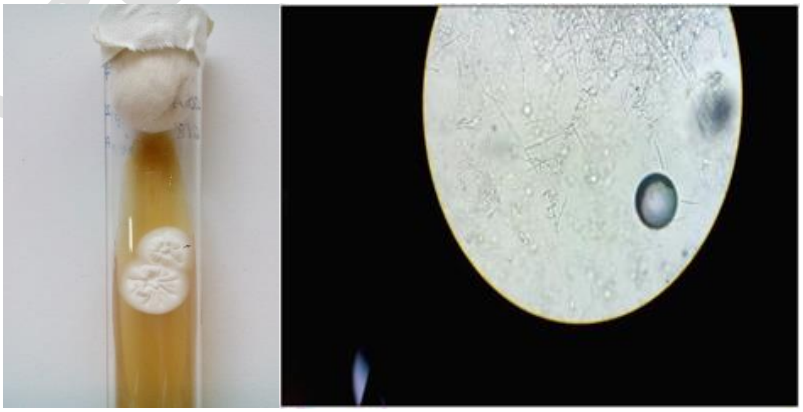

Figure 4. *Trichophyton mentagrophytes*-Growth on SDA and spiral hyphae

Figure 5. a. *Trichophyton tonsurans; b. Trichophyton violaceum;* c. *Trichophyton verrucosum*

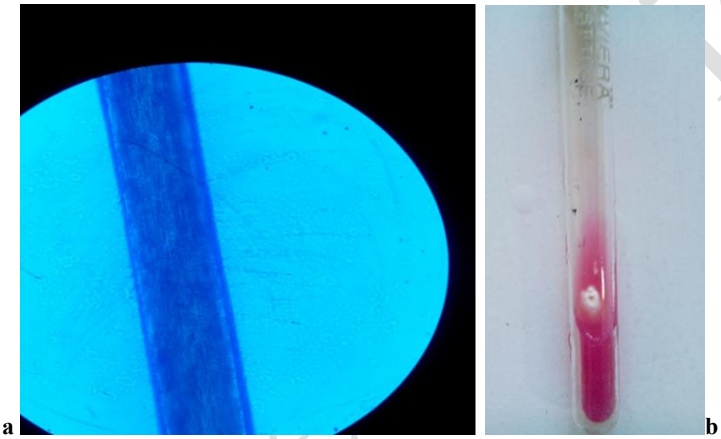

Figure 6. a. Hair perforation test; b. Urease test

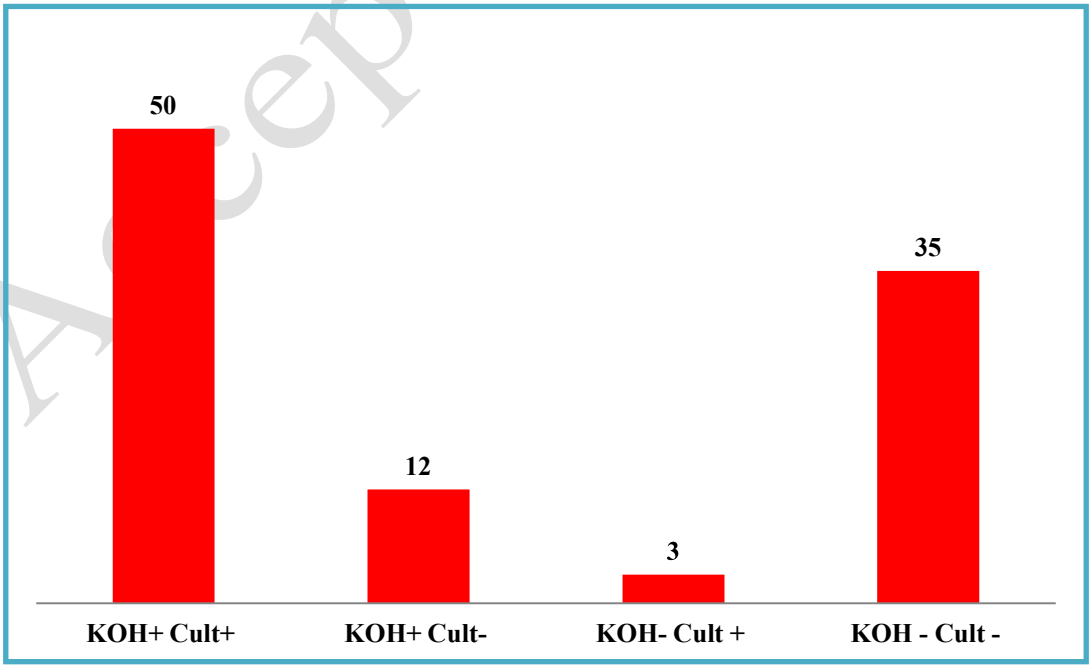

Figure 7. Correlation of results of microscopic preparation and culture